Reducing Greenhouse Gas Emissions from Refrigeration Systems

Federal Offset Protocol

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Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canada

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Forward

The Federal GHG Offset System is being developed under Part 2 of the Greenhouse Gas Pollution Pricing Act (GGPPA). The proposed Greenhouse Gas Offset Credit System Regulations (Canada) were published in the Canada Gazette, Part I (PDF), on March 6, 2021.

The Federal Greenhouse Gas (GHG) Offset System is under development, to encourage cost-effective domestic GHG emissions reductions and removals from activities that are not covered by carbon pollution pricing and that go beyond legal requirements.

The Federal GHG Offset System will consist of:

- regulations to implement the operational aspects of the system;
- a tracking system to register offset projects, issue and track offset credits, and share key information through a public registry; and
- federal offset protocols that establish the approach for quantifying GHG emissions reductions for a given project type.

Federal offset protocols set out a consistent approach for quantifying GHG emissions reductions for a given project type, including clear rules for establishing baselines for approved offset project activities. Only project activities with an approved federal offset protocol and meeting all regulatory requirements will be able to generate credits in the Federal GHG Offset System.

Text in blue boxes is provided throughout this draft version for context but will not be included in the final protocol.

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1.0 Introduction

Emissions of hydrofluorocarbons (HFCs) from refrigeration or air conditioning equipment are caused by releases during equipment installation, leaks from normal operations and when charging equipment with refrigerant, either initially or when re-filling (top-up). Lowering the Global Warming Potential (GWP) of refrigerants used in commercial and industrial refrigeration systems in Canada ensures that unavoidable equipment leaks and the associated impacts on climate change are minimized to the extent possible.

The federal offset protocol for *Reducing Greenhouse Gas Emissions from Refrigeration Systems* is intended for use by a Proponent implementing a meaningful transition away from refrigerants containing HFCs that have high GWP values, in order to generate federal offset credits under the *Greenhouse Gas Offset Credit System Regulations (Canada)*.[1]

The Proponent must follow the methodology and requirements contained in this protocol to quantify and report greenhouse gas (GHG) emission reductions achieved from:

1) the retrofit of existing refrigeration or air conditioning equipment to use a low-GWP refrigerant,
2) the replacement of existing refrigeration or air conditioning equipment with similar equipment containing a low-GWP refrigerant, or
3) in a new facility, the installation of new refrigeration or air conditioning equipment using an ultra low-GWP refrigerant.

Emissions reductions under this protocol cannot be generated from reducing or replacing ozone-depleting substances (ODS) contained in baseline scenario refrigerant, or from an expansion of existing refrigeration equipment.

This protocol is designed to ensure the complete, consistent, transparent, accurate, and conservative quantification of GHG emission reductions achieved as a result of implementing the project activities.

[1] Draft Regulations are posted in Canada Gazette, Part 1, Volume 155, Number 10: https://canadagazette.gc.ca/rp-pr/p1/2021/2021-03-06/html/reg1-eng.html

2.0 Terms and Definitions

Act

means the *Greenhouse Gas Pollution Pricing Act (GGPPA)*[2]

Refrigeration System

means a commercial or industrial refrigeration or air conditioning system made up of one or more pieces of refrigeration equipment.

Global Warming Potential (GWP)

means a metric representing a greenhouse gas's ability to trap heat in the atmosphere compared to carbon dioxide, specified in Schedule 3 to the Act.

High-GWP Refrigerant

means a refrigerant used in the baseline scenario at an existing facility that contains one or more HFCs and has a GWP value that is higher than the corresponding values in Table 2 or higher than the regulatory GWP limit for refrigerants contained within refrigeration equipment that is manufactured, imported, sold, installed or operated in the Canadian jurisdiction where the facility is located.

Low-GWP refrigerant

means a refrigerant that has a GWP equal to or lower than the corresponding values in Table 2 or the regulatory GWP limit for refrigerants contained within refrigeration equipment that is manufactured, imported, sold, installed or operated in the Canadian jurisdiction where the facility is located. For the purposes of this protocol, low-GWP refrigerants do not contain any ozone-depleting substances (ODS).

ODS

means Ozone-Depleting Substances, including all chemicals identified in Parts 1, 2 and 3 of the *Ozone-depleting Substances and Halocarbon Alternatives Regulation* (ODSHAR)[3].

Refrigerant

means a single-component refrigerant, refrigerant blend or refrigerant alternative that is used in refrigeration equipment to provide cooling.

Refrigeration equipment

means commercial or industrial refrigeration or air conditioning equipment, as listed in Table 1.

Ultra Low-GWP refrigerant

means a refrigerant that has a GWP value equal to, or less than 20 and does not contain any ozone depleting substances (ODS).

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[2] https://laws-lois.justice.gc.ca/eng/acts/G-11.55
[3] https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-137/FullText.html

3.0 Baseline Conditions

Proponents implementing projects under this protocol must ensure all baseline conditions in this section are met.

3.1 Eligible Refrigeration Equipment

Refrigeration equipment types listed in Table 1 below are eligible under this protocol.

Table 1: Eligible Refrigeration Equipment Types

#	Type	Description
1	Stand-alone medium temperature refrigeration system	Self-contained refrigeration system with components that are integrated within its structure and that is designed to maintain an internal temperature ≥ 0°C.
2	Stand-alone low temperature refrigeration system	Self-contained refrigeration system with components that are integrated within its structure and that is designed to maintain an internal temperature < 0°C but not < -50°C.
3	Centralized refrigeration system	Refrigeration system with a cooling evaporator in the refrigerated space connected to a compressor rack located in a machinery room and to a condenser located outdoors, and that is designed to maintain an internal temperature at ≥ -50°C.
4	Condensing unit	Refrigeration system with a cooling evaporator in the refrigerated space connected to a compressor and condenser unit that are located in a different location, and that is designed to maintain an internal temperature at ≥ -50°C.
5	Chiller	Refrigeration or air-conditioning system that has a compressor, an evaporator and a secondary coolant, other than an absorption chiller.
6	Commercial air conditioning (AC) system	Air conditioning system (air-to-air) that does not use a water chiller, including large single split or multi-split air-conditioning, variable refrigerant flow (VRF) systems and ducted or packaged rooftop systems.
7	Heat Pumps	Reversible air-conditioning / air-to-air heat pump units that can operate as an air-conditioning unit in hot weather or can provide heating as an air-to-air heat pump in cold weather. In heating mode, the indoor unit functions as condenser and the outdoor unit as evaporator.

Definitions are from ODSHAR, except Commercial AC and Heat Pumps which are from United Nations Environment Program's Ozone Secretariat.

3.2 Baseline Scenarios

The following section describes the baseline scenario conditions that must be met at existing facilities and new facilities, respectively.

3.2.1 Baseline Scenario at Existing Facilities

The following baseline scenario conditions must be met at existing facilities for them to be eligible under this protocol:

a) Refrigeration equipment identified in Table 1 is currently installed for either commercial or industrial purpose, and has been operating in a single facility using the same refrigerant for more than 3 years prior to the project start date.
b) The existing refrigeration equipment is in good working order and is expected to be mechanically sound for the remainder of its useful life.
c) There is no regulatory requirement to either replace the refrigerant or purchase new equipment.

3.2.2 Baseline Scenario at New Facilities

The following baseline scenario conditions must be met by new facilities installing new refrigeration equipment identified in Table 1 for them to be eligible under this protocol:

a) New refrigeration equipment must be installed no more than 12 months after construction of the new facility is complete.
b) The facility in which new refrigeration equipment is installed has not previously housed any type of refrigeration equipment for the same purpose.
c) The new refrigeration equipment being installed represents a new or leading technology that is not widely adopted, or there are supplemental barriers to the implementation of the new refrigeration equipment that the offset project helps overcome.

4.0 Project Conditions

The following sections describe the conditions for project scenarios to be eligible under this protocol.

4.1 Eligible Refrigerant GWP

Low-GWP refrigerants used in the project scenario must have a GWP equal to or lower than the GWP threshold set out in Table 2 below.

Table 2: Low-GWP Threshold for Refrigerants

#	Equipment Type	GWP Threshold
1	Stand-alone medium temperature refrigeration system	1400
2	Stand-alone low temperature refrigeration system	1500
3	Centralized refrigeration system	2200
4	Condensing unit	2200
5	Chiller	750
6	Commercial AC	2000
7	Heat Pumps	2000

Notwithstanding Table 2, the GWP of refrigerant used in the project scenario must be lower than the regulatory GWP limit for refrigerants contained within refrigeration equipment that is manufactured, imported, sold, installed or operated in the Canadian jurisdiction where the facility is located.

GWP values to be used are those specified in Schedule 3 to the Act. Refrigerant GWP must be calculated using Equation 3.

4.2 Project Scenarios

4.2.1 Equipment Retrofit Project Scenario

This project scenario involves the replacement of a high-GWP refrigerant with a low-GWP refrigerant within existing refrigeration equipment located at an existing facility. In order for a project to be eligible under this scenario:

a) Existing refrigeration equipment must be listed in Table 1.
b) High-GWP refrigerant from existing equipment must be extracted and sent to an accredited facility to be reclaimed or destroyed.
c) If the cooling capacity of existing equipment increases due to the retrofit, project scenario emissions are adjusted for functional equivalence using Equation 13.

4.2.2 Equipment Replacement Project Scenario

This project scenario involves the purchase of new refrigeration equipment that contains a low-GWP refrigerant to replace existing equipment containing a high-GWP refrigerant that is located at an existing facility. In order for a project to be eligible under this scenario:

a) New equipment must be listed in Table 1.
b) High-GWP refrigerant from existing equipment must be extracted and sent to an accredited facility to be reclaimed or destroyed.
c) The applicable regulatory GWP limit for a refrigerant in project scenario equipment is used as the baseline GWP value in Equation 9.
d) If no GWP limit applies to the project scenario equipment, then the GWP of a refrigerant in the existing baseline scenario equipment is used as the baseline GWP value in Equation 9.
e) If the new equipment has a larger cooling capacity than the equipment being replaced, project scenario emissions are adjusted for functional equivalence using Equation 13.

4.2.3 New Facility Installation Project Scenario

This project scenario involves the purchase of new refrigeration equipment that is installed at a new facility. In order for a project to be eligible under this scenario:

a) The new refrigeration equipment must contain an ultra low-GWP refrigerant (GWP ≤ 20) for the project scenario emissions quantification in Equation 12.
b) For conservatism, baseline and project scenario emissions quantification must assume a refrigerant is reclaimed with a 99% Refrigerant Recovery Efficiency (RRE) in Equations 9 and 12.
c) For type 6 and type 7 refrigeration equipment, baseline scenario emissions in Equation 9 are quantified using the corresponding GWP threshold value listed in Table 2.

5.0 Additionality

5.1 Legal Additionality

GHG reductions achieved by the project must not have otherwise occurred due to federal, provincial or territorial regulations, legal requirements, municipal by-laws, or any other legally binding mandates.

Federal and provincial regulations exist in Canada that limit refrigerant GWP contained in specific types of new refrigeration equipment. The subject of regulations may vary by jurisdiction and can apply to either the manufacture, import, distribution, sale or installation of new refrigeration equipment, all of which are considered to be relevant GWP limits with respect to the additionality of project activities included in this protocol.

The refrigerant used in all project scenarios outlined in section 4.2 must have a GWP lower than the regulated GWP limit for the applicable equipment type and jurisdiction in which the project is located. For jurisdictions in which both federal and provincial or territorial GWP limits exist, the lowest regulatory GWP limit shall apply.

If a regulatory GWP limit applies to new refrigeration equipment used in the project scenario, that GWP limit is used as the baseline refrigerant GWP value when quantifying baseline scenario emissions for Equipment Replacement and New Facility Installation Projects.

In the absence of an applicable regulatory GWP limit, the GWP value of the existing equipment's refrigerant is used as the baseline refrigerant GWP when quantifying baseline scenario emissions for Equipment Retrofit Projects, and also when new equipment identified in Table 1 as type 6 or 7 is used in Equipment Replacement Projects. New Facility Installation Projects using type 6 or type 7 refrigeration equipment must use the applicable low-GWP threshold outlined in Table 2 as the baseline refrigerant GWP when quantifying baseline scenario emissions.

> As per the Regulations, the reductions can only be additional if those reductions were not required by law or the result of activities that are required by law.

5.2 Federal or Provincial Pricing Mechanisms for GHG Emissions

Any emission reductions from refrigeration equipment that is included in a facility's GHG emissions total reported under a federal, provincial or territorial pricing mechanism for GHG emissions are not eligible for federal offset credits.

GHG reductions due to fossil fuel displacement or increased energy efficiency of refrigeration equipment are not eligible for federal offset credits.

> As per the Regulations, the reductions can only be additional if those reductions are from sources, sinks and reservoirs that are not subject to provincial or federal pricing mechanisms for GHG emissions.

6.0 General Requirements

6.1 Project Start Date

The start date of a project corresponds to the first day on which retrofitted or new refrigeration equipment is fully operational and it is providing refrigeration or air conditioning to an existing or new facility using a low-GWP or ultra low-GWP refrigerant, as applicable.

All projects must have a start date on or after January 1, 2017 and no later than December 31, 2033.

6.2 Crediting Period

Federal offset projects implemented under this protocol have a crediting period specified in the Regulations.

6.3 Crediting Period Renewal

Federal offset projects implemented under this protocol are not eligible for crediting period renewal.

6.4 Aggregation

Projects located in two or more facilities must be aggregated, with each facility considered a discrete project within the aggregation.

6.5 Project Location & Geographic Boundaries

A Proponent must describe the location of each facility in which the new or retrofitted refrigeration equipment is located, to include municipal address and GPS coordinates.

6.6 Environmental and Other Safeguards

All refrigerants must be properly handled according to the relevant jurisdiction's Code of Practice for handling refrigerants by certified professionals with the appropriate qualifications to undertake such work. The Proponent must also ensure the project activities comply with any relevant building codes or other legal requirements for the use of flammable or toxic refrigerants that may pose a human health risk.

7.0 Project GHG Boundary

The Project GHG Boundary (Figure 1) contains the eligible project activities and the GHG sources, sinks, and reservoirs (SSRs) that shall be assessed by the Proponent in order to determine the total reductions in GHG emissions achieved by the project activities relative to the baseline scenario.

Figure 1: Illustration of the Project GHG Boundary

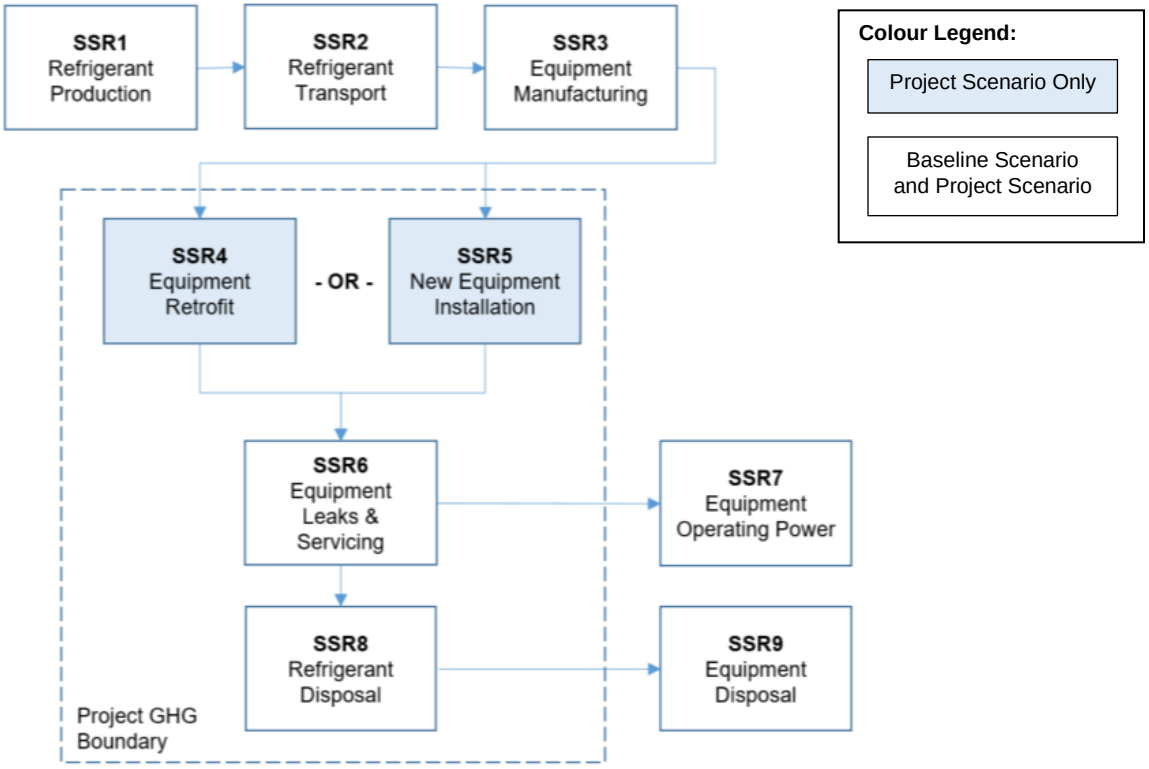

Table 3 provides additional details on the relevant SSRs identified for the baseline and project scenarios, as well as justification for their inclusion or exclusion in the calculation of emission reductions. The Project Proponent must quantify and report on each of the "included" SSRs identified, as applicable.

Table 3: Comparison of Project and Baseline SSRs

SSR	Title	Description	Type	Baseline or Project	GHGs	Included or Excluded
1	Refrigerant production	Electricity consumption, fossil fuel combustion, and refrigerant emissions during the production process.	Related	Baseline (B1) Project (P1)	CO_2, CH_4, N_2O, HFCs	Excluded: GHG emissions from this source occur outside Canada. Fossil fuel usage is covered by carbon pricing.
2	Refrigerant transport	Fossil fuel combustion from transport vehicles and refrigerant leaks during transport.	Related	Baseline (B2) Project (P2)	CO_2, CH_4, N_2O, HFCs	Excluded: Fossil fuel usage is covered by carbon pricing. Refrigerant leaks during transport assumed to be very small.
3	Equipment manufactur-ing	Electricity consumption, fossil fuel combustion, and refrigerant emissions during manufacturing.	Related	Baseline (B3) Project (P3)	CO_2, CH_4, N_2O, HFCs	Excluded: Assumed to be the same in baseline and project, and little equipment manufacturing occurs in Canada.
4	Equipment Retrofit	Emissions from HFC releases when charging existing equipment with low-GWP refrigerant.	Controlled	Project (P4)	CO_2, HFCs	Included for equipment retrofit projects: Expressed as a percentage of charge size in Equation 12.
5	New Equipment Installation	Emissions from HFC releases during the installation of new refrigeration equipment.	Controlled	Project (P5)	CO_2, HFCs	Included for equipment replacement and new facility installation projects: Expressed as a percentage of charge size in Equation 12.
6	Equipment Leaks & Servicing	High-GWP refrigerant leakage that requires re-filling of equipment by certified technicians.	Controlled	Baseline (B6)	HFCs	Included: Expressed as a percentage of charge size in Equation 9.
		Low-GWP or Ultra Low-GWP refrigerant leakage that requires re-filling of equipment by certified technicians.	Controlled	Project (P6)	CO_2, HFCs	Included: Expressed as a percentage of charge size in Equation 12.
7	Equipment Operating Power	Energy consumption emissions from operating refrigeration equipment.	Controlled	Baseline (B7)	CO_2, CH_4, N_2O	Excluded: Electricity sector is covered by carbon pricing.

		Energy consumption emissions from operating refrigeration equipment.	Controlled	Project (P7)	CO_2, CH_4, N_2O	Excluded: Potential emissions increase due to lower energy efficiency of project scenario equipment is expected to be non-material
8	Refrigerant Disposal	Remaining refrigerant at the end of baseline scenario equipment's useful life that is not reclaimed and would be leaked into atmosphere.	Controlled	Baseline (B8)	HFCs	Included: Recovery rate efficiency expressed as a percentage of remaining charge size in Equation 9.
		Remaining refrigerant at the end of project scenario equipment's useful life that is not reclaimed and would be leaked into atmosphere.	Controlled	Project (P8)	CO_2, HFCs	Included: Recovery rate efficiency expressed as a percentage of remaining charge size in Equation 12.
9	Equipment disposal	Fossil fuel combustion from transporting equipment off-site at end of its useful life, after remaining refrigerant has been extracted.	Related	Baseline (B9)	CO_2, CH_4, N_2O	Excluded: Assumed to be the same in the baseline and project scenarios.
		Fossil fuel combustion from transporting equipment off-site at end of its useful life, after remaining refrigerant has been extracted.	Related	Project (P9)	CO_2, CH_4, N_2O	Excluded: Assumed to be the same in the baseline and project scenarios.

8.0 Quantification Methodology

This section contains equations that must be followed to calculate baseline and project scenario emissions, which are subsequently used to calculate the total GHG emission reductions achieved by the project. Raw data must be converted to align with the units presented in the following equations.

Baseline scenario GHG emissions are those that would have occurred in the absence of the project, as quantified from SSRs within the Project GHG Boundary. Project scenario GHG emissions are the actual GHG emissions that occur from SSRs within the Project GHG Boundary.

Included SSRs for the baseline and project scenarios identified in Table 3 result in the following equation representing baseline emissions:

Equation 1: Baseline Emissions SSRs

$$\boldsymbol{BE = SSR\ B6 + SSR\ B8}$$

SSR B6 and SSR B8 correspond to $\boldsymbol{E_{LT}}$ and $\boldsymbol{E_{EOL}}$ respectively, in Equation 4, and are renamed as $\boldsymbol{BE_{LT}}$ and $\boldsymbol{BE_{EOL}}$ in Equation 8 for annual baseline scenario emissions. However, to calculate annual baseline scenario emissions, the Proponent must use Equation 9.

Equation 2: Project Emissions SSRs

$$\boldsymbol{PE = (SSR\ P4\ or\ SSR\ P5) + SSR\ P6 + SSR\ P8}$$

where

SSR P4 is used for equipment retrofit projects only.

SSR P5 is used for equipment replacement and new facility installation projects only.

SSR P4 or P5, SSR P6 and SSR P8 correspond to $\boldsymbol{E_{Install}}$, $\boldsymbol{E_{LT}}$ and $\boldsymbol{E_{EOL}}$ respectively, in Equation 4 and are renamed as $\boldsymbol{PE_{Install}}$, $\boldsymbol{PE_{LT}}$ and $\boldsymbol{PE_{EOL}}$ in Equation 11 for annual project scenario emissions. However, to calculate annual project scenario emissions, the Proponent must use Equation 12.

Equations 9 and 12 are derived from the methodology in Chapter 7 of the 2006 IPCC Guidelines for National Inventory Reports.[4] Table 4 below contains default values for each equipment type that are used to populate Equations 9 and 12 to calculate annual baseline and project scenario emissions.

Table 4: Default Values for Annual Emissions of Refrigeration Equipment

	Equipment Type	Installation Loss % (IL)*	Lifetime of Equipment (LT) (yrs)	Annual Average Refrigerant Leakage % (AARL)	Refrigerant remaining at disposal % (QD)
1	Stand-alone medium-temp refrigeration system	0%	10	1%	90%
2	Stand-alone low-temp refrigeration system	0%	10	1%	90%
3	Centralized refrigeration system	2.0%	18	25%	90%
4	Condensing unit	2.0%	18	25%	90%
5	Chiller	0.5%	23	2%	95%
6	Commercial AC system	0%	25	8%	80%
7	Heat Pumps	0%	25	8%	80%

[4] Intergovernmental Panel on Climate Change, 2006 Guidelines for National Inventory Reports, Volume 3, Chapter 7, section 7.5 - https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_7_Ch7_ODS_Substitutes.pdf

Reference: EPA 2016 report: "Accounting Tool to Support Federal Reporting of Hydrofluorocarbon Emissions: Supporting Documentation" prepared by ICF Consulting[5]
**For equipment retrofit projects, Installation Loss (IL) corresponds to emissions when filling equipment with new low-GWP refrigerant*

Halocarbon venting is prohibited across Canada and refrigerant reclamation is business-as-usual for refrigerant end-of-life. In this case, Proponents must use 99% value for Refrigerant Recovery Efficiency ($RRE = 99\%$).

However, if the Proponent can demonstrate the refrigerant from the baseline refrigeration equipment has been destroyed in Equipment Retrofit or Equipment Replacement projects, then $RRE = 0$. Section 12 contains documentation requirements that must be maintained as evidence of refrigerant destruction.

When refrigerant in existing equipment contains non-greenhouse gas components, such as an ODS, the GWP of the refrigerant must be re-calculated proportionately using only the remaining components that are greenhouse gases specified in Schedule 3 to the Act, excluding the ODS component as outlined in Equation 3 below.

Equation 3: Refrigerant GWP Calculation

$$\boldsymbol{GWP_{Refrigerant}} = \sum_{i} (\boldsymbol{\rho_{GHG,i}} \; \boldsymbol{x} \; \boldsymbol{GWP_{GHG,i}})$$

Where,			**Units**
$GWP_{Refrigerant}$	=	GWP of refrigerant	*t CO_2e/t refrigerant* [6]
$\boldsymbol{\rho}_{GHG,i}$	=	Proportion of greenhouse gas *i,* contained within the refrigerant	*%*
$GWP_{GHG,i}$	=	GWP of greenhouse gas i, as specified in Schedule 3 to the Act	*t CO_2e/t refrigerant*

[5] Environmental Protection Agency (EPA) report: *Accounting Tool to Support Federal Reporting of Hydrofluorocarbon Emissions: Supporting Documentation* prepared by ICF Consulting, October 2016, Table 3-3, p13 and Table 3-6, p17: https://www.epa.gov/sites/default/files/2015-09/documents/hfc_emissions_accounting_tool_supporting_documentation.pdf
[6] While GWP values are constants used as multipliers, this quantification methodology assigns units of equivalent mass in order to convert one unit of refrigerant to one unit of equivalent carbon dioxide when released directly into the atmosphere.

Equation 4 below is Equation 7.10 of the IPCC methodology, which is the Tier 2a emissions factor approach.

Equation 4: IPCC Tier 2a Emissions Factor Approach for Refrigeration Equipment Emissions

$$E_{equip} = E_{Install} + E_{LT} + E_{EOL}$$

Where,			**Units**
E_{equip}	=	Emissions from a single piece of refrigeration equipment or discrete refrigeration system	*t CO_2e*
$E_{Install}$	=	Emissions from retrofitting existing equipment or charging new equipment with refrigerant	*t CO_2e*
E_{LT}	=	Emissions during the useful lifetime of refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*
E_{EOL}	=	Emissions of remaining refrigerant at the end of the refrigeration equipment's useful lifetime	*t CO_2e*

Equations 5, 6 and 7 are included here for reference to illustrate how Equations 9 and 12 are derived from Equation 4.

Equation 5: Installation Emissions for Refrigeration Equipment

$$E_{Install} = \sum_{i,j} GWP * \frac{Q_{i,j}}{1000} * IL_j$$

Where,			**Units**
$E_{Install}$	=	Emissions from retrofitting existing equipment or installing new equipment	*t CO_2e*
$GWP_{i,j}$	=	Global Warming Potential of refrigerant i in equipment j	*t CO_2e/t refrigerant*
$Q_{i,j}$	=	Amount of refrigerant i in equipment j (charge size)	*kg*
IL_j	=	Installation Loss of refrigerant at time of installing new equipment or retrofitting existing equipment, as a percent of full charge. (Project scenario only)	*%*

Equation 6: Emissions During the Useful Lifetime of Refrigeration Equipment

$$E_{LT} = \sum_{i,j} GWP_{i,j} * \frac{Q_{i,j}}{1000} * AARL_j * LT_j$$

Where,			**Units**
E_{LT}	=	Emissions during the useful lifetime of refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*
$GWP_{i,j}$	=	Global Warming Potential of refrigerant *i,* in equipment *j*	*t CO_2e/t refrigerant*
$Q_{i,j}$	=	Amount of refrigerant *i* in equipment *j* (charge size)	*kg*
$AARL_j$	=	Average Annual Refrigerant Leakage for the equipment type *j,* as a percent of full charge	*% / yr*
LT_j	=	Lifetime of equipment *j*	*Years*

Equation 7: End of Life Emissions for Refrigerant

$$E_{EOL} = \sum_{i,j} GWP_{i,j} * \frac{Q_{i,j}}{1000} * QD_{i,j}(1 - RRE_j)$$

Where,			**Units**
E_{EOL}	=	Emissions from remaining refrigerant at the end of the refrigeration equipment's useful life.	*t CO_2e*
$GWP_{i,j}$	=	Global Warming Potential of refrigerant *i* in equipment *j*	*t CO_2e/t refrigerant*
$Q_{i,j}$	=	Amount of refrigerant *i* in equipment *j* (charge size)	*kg*
$QD_{i,j}$	=	Amount of refrigerant *i* remaining at disposal in equipment *j,* as a percent of full charge	*%*
RRE_j	=	Refrigerant Recovery Efficiency for equipment *j*	*%*

8.1 Baseline Scenario Quantification

The Proponent must follow the quantification methodology below to calculate baseline scenario GHG emissions, corresponding to the SSRs included in the baseline scenario.

Proponents must use the appropriate GWP value in Equation 9 for annual baseline scenario emissions quantification for the project activity being implemented, as follows:

1) ***Equipment Retrofit*** – Baseline emissions are calculated using the GWP of the high-GWP refrigerant used in the existing refrigeration equipment.

2) ***Equipment Replacement*** – if a regulatory GWP limit applies, baseline scenario emissions are calculated using the applicable low-GWP refrigerant threshold for each equipment type outlined in Table 2, unless a more stringent jurisdictional GWP limit applies. If no regulatory GWP limit applies, then the high-GWP value of the refrigerant in existing refrigeration equipment is used.

3) ***New Facility Installation*** - Baseline emissions are calculated using the applicable low-GWP refrigerant threshold for each equipment type outlined in Table 2, unless a more stringent jurisdictional GWP limit applies. Where new equipment does not fall within a specific category of Table 2, the Proponent may use the applicable GWP limit for the business-as-usual refrigeration equipment for their application and provide justification for their choice.

To develop an equation for quantifying baseline scenario emissions, Equation 8 below is adapted from Equation 4, where installation emissions ($\boldsymbol{E_{Install}}$) are excluded from the baseline scenario for conservatism.

Equation 8: Annual Baseline Scenario Emissions (Illustrative)

$$\boldsymbol{BE_{Annual}} = \sum_{i,j} \left[\frac{(\boldsymbol{BE_{LT}} + \boldsymbol{BE_{EOL}})}{\boldsymbol{LT_j}} \right]$$

Where,			**Units**
BE_{Annual}	=	Annual emissions of baseline equipment	*t CO_2e*
BE_{LT}	=	Emissions during the useful lifetime of baseline scenario refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*
BE_{EOL}	=	Emissions of remaining refrigerant at the end of the baseline scenario refrigeration equipment's useful lifetime	*t CO_2e*
LT_j	=	Lifetime of equipment *j,* from Table 4	*Years*

$\boldsymbol{BE_{LT}}$ and $\boldsymbol{BE_{EOL}}$ from Equation 8 are then substituted with the formulae in Equations 6 and 7 respectively, to construct Equation 9 below that must be used for quantifying annual baseline scenario emissions.

Equation 9: Calculating Annual Baseline Scenario Emissions

$$\boldsymbol{BE_{Annual} = \sum_{i,j} GWP_B * \frac{Q_{i,j}}{1000} * \left[AARL_j + \frac{\left(QD_{i,j}\,(1 - RRE_j)\right)}{LT_j} \right]}$$

Where,			**Units**
BE_{Annual}	=	Annual emissions of baseline equipment	*t CO_2e*
GWP_B	=	Global Warming Potential of baseline refrigerant. Proponents must use applicable value in Table 2 or regulatory GWP limit, whichever is lower	*t CO_2e/ t refrigerant*
$Q_{i,j}$	=	Amount of refrigerant *i* in baseline scenario equipment *j* (charge size)	*kg*
$AARL_j$	=	Average Annual Refrigerant Leakage of equipment *j,* from Table 4	*% / yr*
$QD_{i,j}$	=	Amount of refrigerant (i) remaining at disposal in equipment *j,* from Table 4	*%*
RRE_j	=	Refrigerant recovery efficiency of equipment *j*, which is 99% for New Facility Installation projects or when refrigerant is reclaimed. If refrigerant of existing equipment is destroyed in Equipment Retrofit and Equipment Replacement projects, then RRE = 0%	*%*
LT_j	=	Lifetime of equipment *j,* from Table 4	*Years*

Table 4 provides default values for calculating baseline scenario emissions in Equation 9 above. These annual baseline scenario emissions are then adjusted to match the length of the reporting period with Equation 10 below, if the reporting period is not 12 months in duration.

Equation 10: Baseline Scenario Emissions during the Reporting Period

$$\boldsymbol{BE = \frac{BE_{Annual}}{12} * T_{reporting}}$$

Where,			**Units**
BE	=	Baseline scenario emissions for the reporting period	*t CO_2e*
BE_{Annual}	=	Annual emissions of baseline equipment (Equation 9)	*t CO_2e*
$T_{reporting}$	=	Number of months in reporting period	*months*

8.2 Project Scenario Quantification

The Proponent must follow the methodology below to quantify emissions corresponding to the project scenario SSRs on an annual basis before adjusting to match the reporting period, if not annual. Project scenario emissions correspond to the use of low-GWP or ultra low-GWP refrigerants in new or retrofitted refrigeration equipment.

To develop an equation for quantifying project scenario emissions, Equation 11 below is adapted for the project scenario using Equation 4.

Equation 11: Annual Project Scenario Emissions (Illustrative)

$$\boldsymbol{PE_{Annual} = \sum_{i,j}\left[\frac{(PE_{Install} + PE_{LT} + PE_{EOL})}{LT_j}\right] * CCR}$$

Where,			**Units**
PE_{Annual}	=	Annual emissions of refrigeration equipment in the project scenario	*t CO_2e*
$PE_{Install}$	=	Emissions from retrofitting existing equipment or charging new equipment with refrigerant	*t CO_2e*
PE_{LT}	=	Emissions during the useful lifetime of refrigeration equipment in the project scenario that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*
PE_{EOL}	=	Emissions of remaining refrigerant at the end of the project scenario refrigeration equipment's useful lifetime	*t CO_2e*
LT_j	=	Lifetime of project scenario equipment *j,* from Table 4	*Years*
CCR	=	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario for Equipment Retrofit or Equipment Replacement projects (see Equation 13). For New Facility Installation projects, CCR = 1	

$\boldsymbol{PE_{Install}, PE_{LT}\ and\ PE_{EOL}}$ from Equation 11 above are then substituted with formulae from Equations 5, 6 and 7 respectively, to construct Equation 12 below that must be used for quantifying annual project scenario emissions, using default values from Table 4.

Equation 12: Calculating Annual Project Scenario Emissions

$$\boldsymbol{PE_{Annual} = \sum_{i,j} GWP_P * \frac{Q_{i,j}}{1000} * \left[AARL_j + \frac{\left(IL_{i,j} + QD_{i,j}\,(1 - RRE_j)\right)}{LT_j}\right] * CCR}$$

Where,			**Units**
PE_{Annual}	=	Annual emissions of refrigeration equipment in the project scenario	*t CO_2e*
GWP_P	=	Global Warming Potential of refrigerant used in retrofitted or new equipment in the project scenario.	*t CO_2e/ t refrigerant*
$Q_{i,j}$	=	Amount of refrigerant *i* in project scenario equipment *j* (charge size)	*kg*
$AARL_j$	=	Average Annual Refrigerant Leakage of equipment *j,* from Table 4	*% / yr*

IL_j	=	Refrigerant releases at time of installing new equipment or charging retrofitted equipment.	*%*
$QD_{i,j}$	=	Amount of refrigerant *i,* remaining at disposal in equipment *j,* from Table 4	*%*
RRE_j	=	Refrigerant Recovery Efficiency of equipment *j*	*%*
LT_j	=	Lifetime of project scenario equipment *j,* from Table 4	*Years*
CCR	=	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario for Equipment Retrofit or Equipment Replacement projects (see Equation 13). For New Facility Installation projects, CCR = 1	

For Equipment Retrofit projects, installation losses (IL) in the project scenario represent any releases that might occur when extracting high-GWP refrigerant from existing equipment and re-charging with the low-GWP refrigerant.

Equation 13: Cooling Capacity Ratio

$$\boldsymbol{CCR = \left(\frac{CAP_{baseline}}{CAP_{project}}\right)}$$

Where,			**Units**
CCR	=	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario	
$CAP_{baseline}$	=	Cooling capacity of baseline equipment	*kW*
$CAP_{project}$	=	Cooling capacity of project equipment	*kW*

Annual project scenario emissions calculated in Equation 12 are then adjusted to match the length of the reporting period with Equation 14 below, if the reporting period is not 12 months in duration.

Equation 14: Emissions during the Reporting Period for Baseline Refrigeration Equipment

$$\boldsymbol{PE = \frac{PE_{Annual}}{12} * T_{reporting}}$$

Where,			**Units**
PE	=	Project scenario emissions for the reporting period	*t CO_2e*
PE_{Annual}	=	Annual emissions from the refrigeration equipment in the project scenario (Equation 12)	*t CO_2e*
$T_{reporting}$	=	Number of months in reporting period	*months*

8.3 Leakage

Market-shifting and activity-shifting leakage do not apply to this project type.

8.4 Total GHG Emission Reductions

The Proponent must use Equation 15 below to calculate the total GHG emissions reductions achieved by the project for each full or partial calendar year within a reporting period.

Equation 15: Total GHG Emission Reductions and Removals

$$ER = BE - PE$$

Where,			Units
ER	=	Total GHG emission reductions	*t CO_2e*
BE	=	Baseline Scenario GHG emissions for the reporting period (Equation 10)	*t CO_2e*
PE	=	Project Scenario GHG emissions for the reporting period (Equation 14)	*t CO_2e*

Both baseline and project emissions calculations must include all the emissions that occurred during the project reporting period, and must include sub-totals in tCO_2e for each calendar year to support serialization of the resulting offset credits by vintage year.

8.5 Summary of Quantification Parameters

Table 5 provides a summary of quantification equations and parameters as well as details regarding measurement and calculation frequency.

Table 5: Quantification Parameters

Parameter	Description	Units	Parameter Type	Measurement / Calculation Frequency
Equation 3: $GWP_B = \sum_i (P_{GHG,i} \times GWP_{GHG,i})$				
GWP_B	GWP of refrigerant in baseline scenario	*t CO_2e/t refrigerant*	Calculated	Once
$P_{GHG,i}$	Proportion of greenhouse gas *i*, contained within the refrigerant	*%*	Calculated	Once
$GWP_{GHG,i}$	GWP of greenhouse gas *i*, as listed in Schedule 3 to the Act	*t CO_2e/t refrigerant*	Referenced	Once
Equation 4: $E_{equip} = E_{Install} + E_{LT} + E_{EOL}$				
E_{equip}	Emissions from a single piece of refrigeration equipment or discrete refrigeration system	*t CO_2e*	Calculated	Once per reporting period
$E_{Install}$	Emissions from retrofitting existing equipment or charging new equipment with refrigerant	*t CO_2e*	Calculated	Once

Parameter	Description	Units	Parameter Type	Measurement / Calculation Frequency
E_{LT}	Emissions during the useful lifetime of refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*	Calculated	Once per reporting period
E_{EOL}	Emissions of remaining refrigerant at the end of the refrigeration equipment's useful lifetime	*t CO_2e*	Calculated	Once per reporting period
Equation 5: $\boldsymbol{E_{Install} = \sum_{i,j} GWP * \frac{Q_{i,j}}{1000} * IL_j}$				
$E_{Install}$	Emissions from retrofitting existing equipment or installing new equipment	*t CO_2e*	Calculated	Once
$GWP_{i,j}$	Global Warming Potential of refrigerant *i* in equipment *j*	*t CO_2e/t refrigerant*	Referenced	Once
$Q_{i,j}$	Amount of refrigerant *i* in equipment *j* (charge size)	*kg*	Referenced	Once
IL_j	Installation Loss of refrigerant at time of installing new equipment or retrofitting existing equipment, as a percent of full charge	*%*	Referenced	Once
Equation 6: $\boldsymbol{E_{LT} = \sum_{i,j} GWP_{i,j} * \frac{Q_{i,j}}{1000} * AARL_j * LT_j}$				
E_{LT}	Emissions during the useful lifetime of refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*	Calculated	Once
$GWP_{i,j}$	Global Warming Potential of refrigerant *i,* in equipment *j*	*t CO_2e/t refrigerant*	Referenced	Once
$Q_{i,j}$	Amount of refrigerant *i* in equipment *j* (charge size)	*Kg*	Referenced	Once
$AARL_j$	Average Annual Refrigerant Leakage for the equipment type *j,* as a percent of full charge	*% / yr*	Referenced	Once
LT_j	Lifetime of equipment *j*	*Years*	Referenced	Once
Equation 7: $\boldsymbol{E_{EOL} = \sum_{i,j} GWP_{i,j} * \frac{Q_{i,j}}{1000} * QD_{i,j}(1 - RRE_j)}$				
E_{EOL}	Emissions from remaining refrigerant at the end of the refrigeration equipment's useful life	*t CO_2e*	Calculated	Once
$GWP_{i,j}$	Global Warming Potential of refrigerant *i* in equipment *j*	*t CO_2e/t refrigerant*	Referenced	Once
$Q_{i,j}$	Amount of refrigerant *i* in equipment *j* (charge size)	*Kg*	Referenced	Once
$QD_{i,j}$	Amount of refrigerant *i* remaining at disposal in equipment *j,* as a percent of full charge	*%*	Referenced	Once

Parameter	Description	Units	Parameter Type	Measurement / Calculation Frequency
RRE_j	Refrigerant Recovery Efficiency for equipment *j*	*%*	Referenced	Once
Equation 8: $\boldsymbol{BE_{Annual} = \sum_{i,j}\left[\frac{(BE_{LT}+BE_{EOL})}{LT_j}\right]}$				
BE_{Annual}	Annual emissions of baseline equipment	*t CO_2e*	Calculated	Once
BE_{LT}	Emissions during the useful lifetime of baseline scenario refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*	Calculated	Once
BE_{EOL}	Emissions of remaining refrigerant at the end of the baseline scenario refrigeration equipment's useful lifetime	*t CO_2e*	Calculated	Once
LT_j	Lifetime of equipment *j,* from Table 4	*Years*	Referenced	Once
Equation 9: $\boldsymbol{BE_{Annual} = \sum_{i,j} GWP_B * \frac{Q_{i,j}}{1000} * \left[AARL_j + \frac{(QD_{i,j}\,(1-RRE_j)}{LT_j}\right]}$				
BE_{Annual}	Annual emissions of baseline equipment	*t CO_2e*	Calculated	Once
GWP_B	Global Warming Potential of baseline refrigerant. Proponents must use applicable value in Table 2 or regulatory GWP limit, whichever is lower	*t CO_2e/ t refrigerant*	Referenced	Once
$Q_{i,j}$	Amount of refrigerant *i* in baseline scenario equipment *j* (charge size)	*kg*	Referenced	Once
$AARL_j$	Average Annual Refrigerant Leakage of equipment *j,* from Table 4	*% / yr*	Referenced	Once
$QD_{i,j}$	Amount of refrigerant (i) remaining at disposal in equipment *j,* from Table 4	*%*	Referenced	Once
RRE_j	Refrigerant recovery efficiency of equipment *j*, which is 99% for New Facility Installation projects or when refrigerant is reclaimed. If refrigerant of existing equipment is destroyed in Equipment Retrofit and Equipment Replacement projects, then *RRE* = 0%	*%*	Referenced	Once
LT_j	Lifetime of equipment *j,* from Table 4	*Years*	Referenced	Once
Equation 10: $\boldsymbol{BE = \frac{BE_{Annual}}{12} * T_{reporting}}$				
BE	Baseline scenario emissions for the reporting period	*t CO_2e*	Calculated	Once
BE_{Annual}	Lifetime emissions of refrigeration equipment that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*	Calculated	Once
$T_{reporting}$	Number of months in reporting period	*months*	Referenced	Once

Parameter	Description	Units	Parameter Type	Measurement / Calculation Frequency
Equation 11: $\boldsymbol{PE_{Annual} = \sum_{i,j}\left[\frac{(PE_{Install} + PE_{LT} + PE_{EOL})}{LT_j}\right] * CCR}$				
PE_{Annual}	Annual emissions of refrigeration equipment in the project scenario	*t CO_2e*	Calculated	Once
$PE_{Install}$	Emissions from retrofitting existing equipment or charging new equipment with refrigerant	*t CO_2e*	Calculated	Once
PE_{LT}	Emissions during the useful lifetime of refrigeration equipment in the project scenario that accounts for average annual refrigerant leakage and average annual emissions during servicing	*t CO_2e*	Calculated	Once
PE_{EOL}	Emissions of remaining refrigerant at the end of the project scenario refrigeration equipment's useful lifetime	*t CO_2e*	Calculated	Once
LT_j	Lifetime of project scenario equipment *j,* from Table 4	*Years*	Referenced	Once
CCR	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario for Equipment Retrofit or Equipment Replacement projects (see Equation 13). For New Facility Installation projects, CCR = 1		Calculated	Once
Equation 12: $\boldsymbol{PE_{Annual} = \sum_{i,j} GWP_P * \frac{Q_{i,j}}{1000} * \left[AARL_j + \frac{(IL_{i,j} + QD_{i,j}(1 - RRE_j)}{LT_j}\right] * CCR}$				
PE_{Annual}	Annual emissions of refrigeration equipment in the project scenario	*t CO_2e*	Calculated	Once
GWP_P	Global Warming Potential of refrigerant used in retrofitted or new equipment in the project scenario	*t CO_2e/ t refrigerant*	Referenced	Once
$Q_{i,j}$	Amount of refrigerant *i* in project scenario equipment *j* (charge size)	*kg*	Referenced	Once
$AARL_j$	Average Annual Refrigerant Leakage of equipment *j,* from Table 4	*% / yr*	Referenced	Once
IL_j	Refrigerant releases at time of installing new equipment or charging retrofitted equipment	*%*	Referenced	Once
$QD_{i,j}$	Amount of refrigerant *i,* remaining at disposal in equipment *j,* from Table 4	*%*	Referenced	Once
RRE_j	Refrigerant Recovery Efficiency of equipment *j*	*%*	Referenced	Once
LT_j	Lifetime of project scenario equipment *j,* from Table 4	*Years*	Referenced	Once
CCR	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario for Equipment Retrofit or Equipment Replacement projects (see Equation 13).		Calculated	Once

Parameter	Description	Units	Parameter Type	Measurement / Calculation Frequency
	For New Facility Installation projects, CCR = 1			
Equation 13: $\boldsymbol{CCR = \left(\frac{CAP_{baseline}}{CAP_{project}}\right)}$				
CCR	Cooling capacity ratio applied to project scenario emissions if cooling capacity is larger than in the baseline scenario			
$CAP_{baseline}$	Cooling capacity of baseline equipment	*kW*		
$CAP_{project}$	Cooling capacity of project equipment	*kW*		
Equation 14: $\boldsymbol{PE = \frac{PE_{Annual}}{12} * T_{reporting}}$				
PE	Project scenario emissions for the reporting period	*t CO_2e*	Calculated	Once
PE_{Annual}	Annual emissions from the refrigeration equipment in the project scenario (Equation 13)	*t CO_2e*	Calculated	Once
$T_{reporting}$	Number of months in reporting period	*months*	Referenced	Once
Equation 15: $\boldsymbol{ER = BE - PE}$				
ER	Total GHG emission reductions	t CO_2e	Calculated	Each Calendar Year
BE	Baseline GHG emissions, using applicable equations as follows: *Equation 4* for Equipment Retrofit project, *Equation 5* for Equipment Replacement project, or *Equation 6* for New Facility Installation project	t CO_2e	Calculated	Each Calendar Year
PE	Project GHG emissions, as per *Equation 8*	t CO_2e	Calculated	Each Calendar Year

9.0 Reversals

This section does not apply to this project type.

9.1 Reversal Risk Management Plan

This section does not apply to this project type.

9.2 Permanence Monitoring

This section does not apply to this project type.

10.0 Environmental Integrity Account

There are no additional provisions regarding the deposit of credits generated into the environmental integrity account.

As per the Regulations, the amount of credits to be deposited into the environmental integrity account for non-sequestration projects is 3% of the total GHG emission reductions.

11.0 Measurement and Data

11.1 Data and Information Management

There is no ongoing measurement required for this protocol.

11.2 Measuring Devices

There is no ongoing measurement required for this protocol.

11.3 Quality Assurance (QA) / Quality Control (QC)

Quality Assurance / Quality Control (QA/QC) procedures must be implemented to ensure that all calculations have been made correctly and can be verified.

11.4 Missing Data

If there is any missing data, no credits can be issued.

12.0 Records

Records that support the implementation of a project including all information and data used in the calculation of total GHG emissions reductions must be kept by the Proponent for the period of time specified in the Regulations.

For refrigeration projects, additional records may include invoices, contracts, calculations, databases, photographs, calibration records and refrigerant chain of custody, as applicable.

For Equipment Retrofit and Equipment Replacement projects, records that must be kept for existing equipment and high-GWP refrigerant in the baseline scenario include:

- Records to demonstrate that the equipment has been maintained according to manufacturer specifications and there is no reason to believe it will not be in good working order until the end of its useful life.
- Evidence to show which refrigerants have been used in the equipment for the past 3 years, at minimum.
- Identification of the equipment manufacturer and the retailer from which existing equipment was originally purchased, and date of initial operations.
- Identification of the refrigerant service provider and description of their qualifications.
- Supporting documentation to demonstrate the last day existing equipment was in operation and the first day on which refrigeration or air conditioning is provided to the facility from retrofitted equipment using a low-GWP refrigerant. (Equipment Retrofit only).
- Documentation showing the complete chain of custody and ownership of refrigerant from the point at which it is extracted from existing equipment to the point at which it arrives at an accredited facility for reclamation or destruction. The information includes:
    - Names, addresses and contact information of all parties buying and selling refrigerants for destruction or reclamation; and
    - The mass of refrigerant at each transaction.

For Equipment Replacement and New Facility Installation projects, records that must be kept for new equipment used in the project scenario include:

- Supporting documentation to demonstrate the first day on which refrigeration or air conditioning is provided to the facility from new equipment using a low-GWP or ultra low-GWP refrigerant.
- Identification of the equipment manufacturer and the retailer from which new equipment was purchased.
- Date of purchase and refrigerant type contained within new equipment.
- Manufacturer specifications and maintenance requirements for all refrigeration equipment included in the project.
- Identification of the refrigerant service provider and description of their qualifications.

The Proponent must also keep records from the project registration application, including ownership or authorizations for the use of the facility and refrigeration equipment, as well as entitlement to the GHG emission reductions associated with the project.

13.0 Verification Requirements

13.1 Competency Requirements for Verification Teams

The Verification Body shall ensure at least one individual on the verification team has previous experience verifying refrigeration equipment emissions or refrigerant-related offset projects and has direct experience related to refrigerants used in commercial and industrial refrigeration equipment.

13.2 Site Visits for Aggregated Projects

There are no additional requirements for verification of aggregated projects.

14.0 Reporting Requirements

The Proponent must report the quantified GHG emissions emitted or removed for each SSR included in the baseline and project scenarios, in tCO_2e.